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Application/CN: 10/604,360

September 27, 2005

Application Filed: 14 July 2003

Applicant: Spero, Yechezkal Evan

Title: Multiple Light-Source Illuminating System

Examiner: Bao Q. Truong

Art Unit: 2875

Correction of Error in Reply to Office Action Mailed July 25, 05

Commissioner for Patents
Washington DC

Sir:

A Complete List of Claims

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In error the dependant claim references were not updated in the text of the claims. The following is a corrected complete list of the claims pursuant to 37CFR 1.121.

Claims

28. [20] An illuminating device providing controlled illumination in an environment to be illuminated comprising:
- a) a plurality of light sources emanating light, said light sources having a respective spatial light intensity distribution of substantial directionality and said light sources having a respective spectral wavelength characteristic;
 - b) a structure having a geometry where said structure has apparatus for correlating said geometry to said environment to be illuminated;
 - c) a first light source mounted to said structure such that said spatial light intensity distribution has a directionality respective to said geometry;
 - d) one or more additional light sources mounted to said structure such that said light source's spatial light intensity distribution has a directionality respective to said geometry differing from the directionality of the first; and

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e) where said directionality which effects the mixing, adding and distribution of emanating light is determined according to the environment to be illuminated

so as to produce a new, more useful and precise illuminating characteristic such as providing a uniform illumination at points non-equidistant from the illuminating device.

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29. [21] The illuminating device of claim 28 is a lighting application oriented luminaire designed according to principles of lighting practice, providing said controlled illumination intensity, spectrum, and spatial distribution of intensity and spectrum, suited to the specific lighting application, comprising a plurality of light sources capable, when operating in combination, of providing the correct intensity, spectrum, and spatial distribution of intensity and spectrum for the environment to be illuminated.
30. [22] The illuminating device of claim 29 wherein the intensity, spectrum, and spatial distribution of intensity and spectrum is adjusted for changes in the environment to be illuminated in accordance with the lighting application comprising: a) a means for sensing the changes and b) a means for changing the light emanating characteristics of the light sources, thereby providing the correct intensity, spectrum, and spatial distribution of intensity and spectrum as a function of time.
31. [23] The illuminating device of claim 28, wherein the illuminating device has structure and is a luminaire having functional, accepted comfort and aesthetic characteristics providing controlled illumination comprising:
- a) a plurality of light sources having light intensity, spatial light intensity distribution and spectral characteristics, and
 - b) where said light sources are attached to the structure such that the spatial light intensity distribution of said independent light sources is having a

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directionality to said structure and position on said geometric support structure, and

c) where said spatial light intensity distribution characteristic, spectral wavelength characteristic, position and directionality of a light source is determined by using lighting equations to calculate the required light source properties according to one or more of the lighting application requirements, and

d) where said requirements include calculatable items from the list comprised of: illuminance, color temperature and color rendering over the environment to be illuminated and

e) where the luminaire design criterion include any items from the list comprised of: luminous intensity, spectral wavelength distribution, the requirement of maintaining an acceptable continuum of spatial illumination and the requirement of maintaining an acceptable continuum of spatial color effects and the requirement of maintaining an acceptable glare rating for the luminaire, and

f) where the support structure has a considered geometry determined by the requirement of supporting the said independent light sources at the proper aimings and positions on the surface, and

g) where size, shape and coloring of the geometric support structure is also function of one or more considerations including containing the light sources, the functional ancillary equipment and aesthetic considerations.

32. [24] The illuminating device of claim 29, further comprising elements selected from the group consisting of:

a) a power supply element providing current at a voltage to the light sources and other ancillary equipment; and,

b) a differentiated power supply element capable of varying power to said independent light sources having means to effect the sending or not sending an independent electric power signal differentiated in voltage, current or frequency to each light source or group of light sources; and,

- c) a controller for adjusting the power to the light sources to such that a particular amount of power supplied to the light source generates a corresponding intensity and provides the correct intensity, spectrum, and spatial distribution of intensity and spectrum for the application; and,
- d) a storage media device capable of storing and recalling stored data relating to performance, algorithms, lighting parameters and, 5
- e) a controller capable of receiving inputs and by means of recalling stored parameters, processing algorithms, and calculating results, generates output control signals to adjust the illumination according to correct lighting practice; and, 10
- f) a photosensor for providing light spectrum and intensity information to the controller, said information for use in said adjusting; and,
- g) a motion detector for providing occupant sensing information to the controller, said information for use in said adjusting; and,
- h) a communications element coupled to the controller comprised of a receiver for receiving a data signal from an external device, and, 15
- i) a communications element coupled to the controller comprised of a transmitter for transmitting a data signal to an external device, and,
- j) a remote control man-machine interface input device capable of communicating data with the communications element; and, 20
- k) a machine vision system comprised of an imaging device, object recognition and,
- l) optical elements situated proximate to each individual light source, groupings of light source or all the light sources to control the direction of the emanating light, where the term optical refers methodologies used for redirecting light rays through any of the known phenomenon including: reflection, refraction and diffraction, 25
- m) a mechanical assembly for the support of light sources, power supplies, controllers, sensors and other ancillary equipment and,
- n) a satellite reflector receiving light from the luminaire and redirecting said light to illuminate a distant area. 30

33. [25] The illuminating device of claim 32, wherein said controller is selected from the list consisting of,

a) an open-loop controller, factory programmed, for use in general lighting according to correct lighting practice: and, 5

b) an open-loop controller, user-programmed, by use of a programming method taking into account the lighting requirements of the environment in which the luminaire is to be used: and;

c) a closed loop controller, user-programmed, by use of a programming method taking into account the lighting requirements of the environment in which the luminaire is to be used; and, 10

d) a closed loop controller user-programmed, by use of a programming method taking into account the lighting requirements of the environment and self-adjusting in response to the changing lighting requirements of the environment in which the luminaire is located: and, 15

e) a closed loop controller, self-adjusting in response to the lighting requirements of the environment in which the luminaire is located, without pre-programming.

34. [26] A method for designing an lighting application oriented luminaire comprised of a plurality of light sources having having light intensity, spatial light intensity distribution and spectral characteristics, providing controlled illumination in an environment to be illuminated comprising the steps of: 20

a) determining the application and illuminance requirements of said environment to be illuminated 25

b) determining the illumination area of said environment or field of view to be covered

c) determining the light source intensity, spatial intensity distribution, spectral wavelength characteristic and directionality aimings which meet the said illuminance requirements. 30

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35. [27] The method for designing a lighting application oriented luminaire of claim 34, designed according to lighting practice, providing light intensity, spectrum, and spatial distribution of intensity and spectrum, suited to the environment to be illuminated further comprising steps selected from the group consisting of:

- a. determining the lighting application, and the recommended lighting practices, illumination and glare ratings required for the application, and 5
- b. determining the luminaire mounting height, illumination area covered and surrounding conditions of the application, and
- c. determining light power required to effect the required illumination over the area, and 10
- d. selecting light sources capable of producing required intensities and spectrum at highest conversion efficiencies at lowest economic cost, and
- e. determining light source beam spreads, and
- f. determining light source aimings for the required distribution pattern, and
- g. determining electronics to control and power light source, and 15
- h. determining lighting fixture surface geometry size and glare rating, and
- i. testing whether the glare rating for the viewing angle is acceptable and
- j. if the glare rating is not acceptable, then changing light source beam spread, and fixture geometries, or size, resulting in an acceptable glare rating; and, 20
- k. when the glare rating is acceptable, then designing the luminaire aesthetics for the application.

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Sept. 27, 05

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Date : September 27th, 2005

Inventor's signature: *Evan Spero*

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